

TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

August 2, 2005

TO: Internal File

THRU: D. Wayne Hedberg, Permit Supervisor

THRU: Wayne Western, Team Lead

FROM: Priscilla Burton, Environmental Scientist III, Soils

RE: North Lease Subsidence Mining, Canyon Fuel Company, Skyline Mine, C/007/0005, Task #2246

SUMMARY:

The Division previously reviewed Canyon Fuel's plans to undermine perennial streams within North Lease area (Winter Quarters Tract) in February 2005 (Task #1976). The revised proposal was received May 2005. Although I was not previously on the review team, I was asked to evaluate the currently available information for the existence of an Alluvial Valley Floor in the permit area.

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ALLUVIAL VALLEY FLOORS

Regulatory Reference: 30 CFR 785.19; 30 CFR 822; R645-302-320.

Analysis:

Alluvial Valley Floor Determination

The existence of an alluvial valley floor with irrigated pastures and areas of subirrigation along Mud Creek in Pleasant Valley below the Utah No. 2 Mine (now called the White Oak Load Out) was previously established by the Division (1984 Technical Analysis of the Valley Camp Mine, ACT/007/001, and Valley Camp MRP Map R645-301-411.100 Premining Land Use Map). Figure 2.12.D in the Skyline Mine MRP illustrates the locations of pastures downstream and outside the permit area.

Although the alluvial valley is outside the permit area, Skyline Mine discharge waters flow down Eccles Creek and then to Mud Creek. Mud Creek flows through Pleasant Valley, the alluvial valley floor. The gradient of Mud Creek is approximately 0.0091 ft/ft with a sinuosity ratio of 1.6. These figures were derived from aerial photographs (personal communication, November 15, 2002, between Rich White, Earth Fax Engineering, and Priscilla Burton). The channel flattens on approach to Scofield Reservoir with an average gradient of 0.02 to 0.1 ft/ft. Channel subsoils are silty sands and clayey silts, classified by the 1988 Carbon County Soil Survey as Silas and Silas Brycan series. The results of laboratory analysis on the physical properties of the soils in the creek are found in Appendix B of Appendix D of the July 2002 Addendum to the Skyline Mine PHC. Cross sections of the channel describe a channel bed that is 96% cobbles and gravels and side slopes that are 100% sand, silt and clay (Appendix E of Appendix D of the July 2002 Addendum to the Skyline Mine PHC). Low flow terraces are limited in extent and the channel is incised. There is no broad flood plain.

Cross sections of the Mud Creek channel were measured at six different stations. The piezometric surface was measured at four of those stations. At Station 7300, in the vicinity of Green Canyon, the groundwater is four feet below the surface. In the area of Station 14480, the groundwater level is eight feet below the surface, reflecting the rolling nature of the land and the incised nature of the stream channel. The ground water rises back up to four feet below the surface at Station 17340, the site of an irrigation diversion (Section 2.12 of the Skyline Mine MRP).

Measurements of flows taken on November 26, 2001 (Appendix D, Skyline Mine MRP) recorded 18.4 cfs in Mud creek after the confluence with Eccles Creek and 24.44 cfs after the confluence with Winter Quarters Creek. The gain in flow downstream was attributed to

contributions from springs and side streams (2 – 3 cfs) and re-emerging base flow from the alluvium of 3 – 4 cfs (Section 2.12 and Appendix D July 2002 Addendum to the Skyline Mine PHC).

Similarly, there exists an alluvial valley floor in the broad, valley bottom of Winter Quarters Canyon and Woods Canyon, outside the permit area (MRP, Section 2.12). Figure 2.12.D illustrates the locations of pastures. Table 2.12.3 provides information on land ownership, pasture size, and crop grown. There are six landowners along Mud, Winter Quarters, and Woods Canyon Creeks. The land is used for grazing of pasture grass. All pastures were estimated to produce 2.5 Tons/acre of grass annually (Ray Jensen, Range Specialist for the Bureau of Land Management (BLM) is the source of this yield estimation. He suggested a range of 4000-6000 pounds/acre for sub-irrigated grassland, in 2001.) The predominant vegetation type is grass. Pastures are grazed by horses and cows (Division observation). The number of animals grazed on the pastures by each landowner is variable with time.

Within the permit area, the sinuosity of Winter Quarters Creek is 1.1 and the channel width varies from 6 – 8 ft. Flows ranged from 108 – 871 gpm during the baseline gathering study period. In Woods Canyon, the AVF is limited to 3 acres and sinuosity and channel width were not measured. However the flow ranged from 23 – 410 gpm during baseline collection (Section 2.12).

The upper reaches of the streams contributing to the alluvial valleys will be undermined with planned subsidence as described in the MRP, Section 4.17 and Drawing No. 4.17.1-1 and Drawing No. 4.17.1-2. The anticipated maximum subsidence is six feet (Section 4.17 and Drawing 4.17.3-1A). Consequently, monitoring of stream flows (Section 2.4) and vegetation (section 2.7) during and immediately after mining will take place.

Protection of Agricultural Activities

Mud Creek stream channel vegetation was assessed in December 2001 by Dr. Patrick Collins of Mt. Nebo Scientific (Appendix A of Appendix D July 2002 Addendum to the Skyline Mine PHC). A level II investigation was conducted using the methods of the USDA Forest Service. Two reaches were located on Mud Creek. Reach #4 is located just below the confluence of Eccles and Mud Creeks. The riparian community was approximately 91 feet wide and consisted of willows, sedge and rush grasses. Approximately 80% of the banks were vegetated and stable. Downstream, at Reach #5, the width of the riparian community broadened to 120 feet and consisted mostly of willows growing in both riparian and wetland communities. Approximately 60% of the bank was vegetated and stable. (February 27, 2002 EarthFax report in Appendix D of July 2002 Addendum to the PHC). Additional fieldwork observations were conducted in the summers of 2002 and 2003 (July 2004 Mt. Nebo Scientific, Inc report entitled, “Baseline Monitoring Riparian Plant Communities at Eccles Creek & Mud Creek 2002-2003”).

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According to the July 2004 report, there may be some increase of the riparian communities along the stream channel. Weak or unstable banks were found at 19 out of 49 locations in Eccles and Mud Creeks. However, no major catastrophic changes to the banks or the riparian communities near them were noted. The Permittee has been pro-active in stabilizing banks with dead wood and boulders. In these locations, the July 2004 study notes the banks are beginning to recover.

Monitoring

Scofield Reservoir is a drinking water source for Price, and a premiere cold water fishery in the State. Unfortunately, the EPA has listed it as an impaired water body. Of special concern is the concentration of total phosphorus in the reservoir (Appendix E of the July 2002 Addendum to the PHC). A significant source of phosphorus pollution in the Scofield Reservoir is the sediments entering the reservoir delivered by Mud Creek. Using the information in the Division's Water Quality Database for TSS and flow at sample locations C6 on Eccles Creek, VC9 on Mud Creek and VC1 on Mud Creek, the average sediment yield carried by Eccles and Mud Creek prior to 1999 was 2,710 Tons/yr. The average sediment yield carried by Eccles and Mud Creek between 1999 and 2002 has been 2,908 Tons/yr. This translates to an increase of 7% annually.

Consequently, the contributions of mine water to the increased phosphorus loading will be evaluated in the monitoring plan proposed by the Permittee (Section 2.12 Attachment 3). Monitoring at two sites on Eccles and five sites on Mud Creek will include: total flow, TDS, TSS, and total phosphorous, stream morphology. (Station locations are shown on Figure 1 Location of Reference Sites Attachment 3 Land Use of Section 2.12.) Stations will be monitored four times a year (seasonally) and for a period of one year following a reduction in discharge to a rate of 350 gpm or less. Sediment yield loading from flows in Mud Creek will be computed from the TSS and flow data collected. Annual evaluations of the stream will be summarized in a report to be submitted to the Division with the Skyline Mine Annual Report. The monitoring plan will also evaluate the changes in stream morphology and vegetation at the stations over the same time period. The Study Plan prepared by Dr. Patrick Collins on July 4, 2002 entitled "Continuing Studies of the Effects of Increased Flows on Riparian Communities at Eccles Canyon Creek & Mud Creek," is included in Attachment 3 of Section 2.12. This Level III assessment of the riparian communities of Eccles and Mud Creeks will be conducted for two years beginning in 2002 and being completed in 2003, with fieldwork being conducted in July and August.

The mine waters being discharged had an average Total Dissolved Solids (TDS) level of 600 mg/L in July of 2000. With continued pumping, the concentration of TDS has decreased to less than 400 mg/L as of March 2002 and averaged 518 mg/L in 2003. Above the mine, the average concentration of TDS is 300 mg/L (July 2002 Addendum to the PHC).

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Stations along Mud Creek will be monitored four times a year (seasonally) for a period of one year following a reduction in discharge to 350 gpm or less. Sediment loading in Mud Creek will be computed from the TSS and flow data collected. Annual evaluations of the stream will be summarized in a report to be submitted to the Division with the Skyline Mine Annual Report. The monitoring plan will also evaluate the changes in stream morphology and vegetation at the stations over the same time period.

Monitoring of stream flows (Section 2.4) and vegetation (Section 2.7) in Woods and Winter Quarters Creeks during and immediately after mining will provide a trigger for implementing the best technology available to mitigate the damage (Section 4.17). The BTCA for repair of subsidence cracks will be jointly determined immediately prior to implementation (Section 2.7), but will likely involve backfilling with surrounding material and bentonite (Section 4.17).

Findings:

In accordance with R645-302-323.122, the Division finds that the Skyline Mine operations have not materially damaged the underground water systems in Pleasant Valley, which is outside the permit area of the existing coal mining and reclamation operation. The increased mine discharge has had no negative impact on agricultural activity along Mud Creek. Instability in the channel banks and increased erosion of the stream channel in reaches of the channel that are not well vegetated are very small in relation to the acreage being pastured and are negligible to the total production of the pastures.

The Division finds that there has been no significant impact to productivity of the pasturelands in Pleasant Valley.

The Division finds that the quality of the mine water discharge in terms of Total Dissolved Solids has improved with the quantity of water discharged. (No conclusive information on the Phosphorus contributions of sediments carried by the Mud Creek waters is available at this time.)

In accordance with R645-302- 324.300, The Division has required continued monitoring of the vegetation, erosion of banks, flows and chemical quality of the waters at established locations on Mud Creek, Winter Quarters Creek and Woods Canyon Creek.